REMARKS

Claims 1, 7, 9, 10 and 12-14 are pending in this application.

Claim 1 has been amended in this Amendment.

This response is submitted with Request for Continued Examination.

I. Claim Rejections – 35 U.S.C. §103

1. Claims 1, 7, 9, 10, and 12-14 stand rejected under 35 U.S.C. 103(a) as being unpatentable over US 2002/0034656 A1.

In the previous Office actions (Paper Nos. 20050121 and 20051216), the examiner argued that the '656 publication discloses similar Ir based compound such as the compound having the formula of Fig. 16, and different ligands taught in Fig. 49, and that the differences between the prior art and the claims is in the position of phenyl ring with respect to the quinoline making it a positional isomer.

First, isomerism by itself should not raise a prima facie case of obviousness. *Ex parte Mowry*, 91 USPQ 219, 221 (Bd. Pat. App. 1950).

MPEP §2144.09 recites this decision: "Isomers having the same empirical formula but different structures are not necessarily considered equivalent by chemists skilled in the art and therefore are not necessarily suggestive of each other. (claimed cyclohexylstyrene not prima facie obvious over prior art isohexylstyrene). The Federal Circuit has admonished against generalizing, especially in the area of chemical structural obviousness, requiring proof in the prior art to support a proposed structural change. See *In re Grabiak*, 769 F.2d 729, 731-32, 226 USPQ 870, 872 (Fed.

Cir. 1985)

Here, the '656 publication does not disclose that the *specific* property of the compound having the aryl quinoline of Fig. 49. The '656 publication merely discloses the compounds may produce an emission at a wavelength between 400 nm and 700nm, which includes the blue, the green and the red regions. The '656 publication does not disclose how to select ligands to make a **red luminescent compound**. The properties shown in the '656 publication include the properties of the green luminescent compound as well as the red luminescent compound. Accordingly, the fact that the '656 publication compounds have different properties implies that there is no reasonable expectation of similar properties in structurally similar compounds.

Here, it cannot be reasonable to infer that they would share similar properties (i.e., red luminescent).

Also, there is no suggestion or motivation to modify the '656 publication.

Moreover, the applicant expressly stated that the compounds according to present invention has excellent luminescent efficiency and film stability, whereas it is expressly stated in the specification that the compounds disclosed in U.S. 2002/0121638A1 and U.S 2002/0034656 A1 still require improvements in luminescent efficiency and film stability. (See the specification on page 3, lines 7-12).

The reconsider of the rejection is respectfully requested.

Second, the examiner failed to establish a prima facie case of obviousness because the '656 publication does not teach or suggest the X ligands recited in claims 1, 7, 9, 10, and 12-14.

To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

Here, the examiner did not provide a concrete reasoning for claims 7, 9 and 10.

Claim 1 recites that "X is a bidentate ligand selected from the group consisting of α-amino acid L-proline, 2-quinoline carboxylate, and 1-(2-hydoxyphenyl) pyrazolate." Particularly, in the dependent claims, the X group of Formula 1 is proline in claim 7, 2-quinoline carboxylate in claim 9, and 1-(2-hydrophenyl)pyrazolate in claim 10. These groups are not disclosed in the '656 publication. The examiner merely stated that "different X values are also taught in the US publication," but the groups in claims 7, 9 and 10 are not found in the '656 publication. The examiner did not sufficiently explain which ligands have similar structures to the structure of the ligands in claims 1, 7, 9 and 10, respectively.

MPEP 707.07(f) states that:

> "In order to provide a complete application file history and to enhance the clarity of the prosecution history record, an examiner must provide clear explanations of all actions taken by the examiner during prosecution of an application."

Since the PTO has the burden of showing by substantial evidence that an applicant is not entitled to a patent, the quoted statement is not sufficient; a decision on patentability must be supported by substantial evidence, not merely by speculation. *In re Zurko*, 258 F.3d 1379, 1385-86 (Fed. Cir. 2001) ("With respect to core factual findings in a determination of

patentability" PTO "must point to concrete evidence in the record" and it "cannot simply reach conclusions based on its own understanding or experience—or on its assessment of what would be basic knowledge or common sense").

The applicant respectfully requests the examiner to provide a concrete reasoning for claims 7, 9 and 10.

Regarding α-amino acid L-proline, please note that Figure 49 of the '656 publication discloses a structure of amino acids in Figure 49, but proline is the only exception among 20 amino acids found in protein and a secondary amine. Proline contains an unusual ring to the N-end amine group, which forces the CO-NH amide sequence into a fixed conformation. Thus, Figure 49 of the '656 publication does not disclose the proline. Also, 2-quinoline carboxylate in claim 9 is neither taught nor suggested by the '656 publication. Also, the use of any pyrazolate is neither taught nor suggested by the '656 publication.

The selection of X is not predictable. The '656 publication expressly teaches that "**the choice of X ligand affects both the energy of emission and efficiency**," (see para [0248]) that "**the wrong choice of X ligand can also severely quench the emission from L_2IrX complete**" (see para [0250]). The '656 publication also discloses that even similar ligands such as hexafluoro-acac and diphenyl-acac complexes quench emission, but the reasons are not at all clear. (See the paragraph [0250]). Since the emission according to X is unpredictable and it cannot be reasonable to infer that they would share similar properties, the disclosed X ligands in the '656 publication does not render the compounds in claims 7, 9 and 10 obvious. (*In re May*, 574 F.2d

1082, 1094, 197 USPQ 601, 611 (CCPA 1978) (*prima facie* obviousness of claimed analgesic compound based on structurally similar prior art isomer was rebutted with evidence demonstrating that analgesia and addiction properties could not be reliably predicted on the basis of chemical structure); *In re Grabiak*, 769 F.2d 729, 731-32, 226 USPQ 870, 872 (Fed. Cir. 1985) (finding no prima facie obviousness where the prior art did not suggest appellant's substitution of a thioester for an ester substituent on a carboxamide compound)).

The examiner's attention is also invited to consider the following points.

Color purity and thermal property of Iridium compound of represented by the Formula (1) depends greatly on X ligand of chemical formula (1), as recognized by the '656 publication.

When the compound of formula (1) where X is α -amino acid L-proline is used for forming an emissive layer of an organic EL device, the organic EL device has improved red light emitting characteristic than the organic EL device having emissive layer formed of the compound of formula (1) where X is picolinate (pic).

Also, when the compound of formula (1) where X is 2-quinoline carboxylate is used for forming an emissive layer of an organic EL device, the compound has increased glass transition temperature (Tg), and thus the compound provides improved thermal properties, compared to the compound of formula (1) where X is pic.

When the compound of formula (1) where X is 1-(2-hrdroxyphenyl)pyrazolate (pzp) is used for forming an emissive layer of an organic EL device, the compound has decreased T_1 triplet energy shown in the below Table 3, and thus the organic EL device has improved red light emitting characteristic compared with that of the compound of formula (1) where X is pic.

Table 3 DFT Calculation results for $pq_2Ir(LX)$ complexes(in eV)[a)]

states	$pq_2Ir(LX)$				
	tmd	pzp	L-pro	pic	quin
T_1	2.110	2.176	2.199	2.218	2.228
T_2	2.190	2.221	2.248	2.267	2.280
S_1	2.330	2.269	2.433	2.445	2.426
S_2	2.386	2.321	2.470	2.497	2.508
H-3	−5.711	−5.635	−5.898	−5.901	−5.856
H-2	−5.153	−4.915	−5.618	−5.600	−5.586
H	−4.800	−4.839	−5.016	−5.017	−5.045
L	−1.799	−1.770	−1.920	−1.904	−1.957
L+1	−1.700	−1.688	−1.854	−1.831	−1.838
L+2	−0.818	−0.796	−1.088	−1.358	−1.772

[a] T is triplet, S singlet states , H HOMO and L LUMO states.

That is, the recited X ligands in claims 1, 7, 9, 10, and 12-14 are not obvious over the '656 patent publication.

Moreover, the CCPA in *In re Ruff*, 256 F.2d 590, 118 USPQ (CCPA 1958), reversed the Board's holding of obviousness of a composition based on a theory of equivalence between the remaining member of a Markush group and a canceled member found in the prior art. The CCPA held that actual equivalence will not suffice "to justify refusal of a patent on one member of a [Markush] group when another member is in the prior art. The equivalence must be disclosed in the prior art or be obvious within the terms of Section 103." *Id.* At 599, 118 USPQ at 348. The examiner should offer evidence tending to show an art-recognized equivalence between the recited X groups in claims 7, 9 and 10 and the disclosed groups in the '656 publication.

II. Claim Rejections – 35 U.S.C. §112

Claim 1 and 12-14 stand rejected under 35 U.S.C. §112, first paragraph.

In the previous Office actions (Paper Nos. 20050121 and 20051216), the examiner argued that the specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims.

As stated in our previous reply, the specification clearly includes Examples and the specific compounds. The specific compounds include the compounds represented by Formulae 2 through 7. Furthermore, Examples of substituted groups are expressly stated from para [0039] through [0047]. Synthesis examples are explained from para [0071] through [0092], and examples of using the compounds are explained from para [0093] through [0098].

The examiner additionally argued that "the art is highly unpredictable." Please note that the examiner argued for obviousness rejection that it may be predicted that the structural similarity may make the compounds have the similar property, whereas the examiner argued that the change of the substituent is highly unpredictable. The examiner also argued that "applicants claims have so many R1-R10 substitutions, and if applicants arguments are stating that even similar isomers such as given above are not obvious, then how does one expect all the various large substitutions to be enabled?". The examiner confuses the change of the basic aromatic or aliphatic structure with the change of the substitution of H attached to the basic aromatic or aliphatic structure.

It should be noted that R1-R10 are substituents for the hydrogen atoms bonded to a basic 2-phenyl quinoline structure. Generally, it is recognized that the hydrogens in 2-phenyl quinoline

structure would not have been expected to significantly affect the light emitting properties of the compounds even if the modification of the basic structure of 2-phenyl quinoline may alter the emissive properties. In other words, the substitution of H with a hydrocarbon group or halogen in a quinoline is regarded as a general derivative of quinoline in the art, and, like hydrogen, the listed groups of R1-R10 are a univalent radical. It requires a permissible amount of experimentation, it is merely routine, and how to practice a desired embodiment of the invention claimed is well within the ordinary skilled person's knowledge and/or the specification.

The examiner also unreasonably argued that the prior art ligands also do not have any substituents hence there is very little predictability in the art that these would be enabled.

Even the '656 publication recognized that "[o]ne of ordinary skill may modify the organic component of the $Ir(ppy)_3$ to obtain desirable properties....One may have alkyl substituents or alteration of the atoms of the aromatic structure" (emphasis added, see paragraphs [0169] and [0170] in the '656 publication), and "[A line segment denotes possible substitution at any available carbon atom or atoms of the indicated ring by alkyl or aryl groups.]" The replacement of the hydrogen atoms attached to the basic skeleton of the aromatic compounds rather than the change of the based skeleton of the compounds are predictable. The examiner unreasonably required the applicant to disclose a heightened level of disclosure even in the predictable area. (See also the paragraph [0173] and claim 75 in the '656 publication where R and R' are alkyl or aryl). That is, the prior art recognized that it requires a permissible amount of experimentation, it is merely routine, and how to practice a desired embodiment of the invention claimed is well within the ordinary skilled person's knowledge and/or the specification.

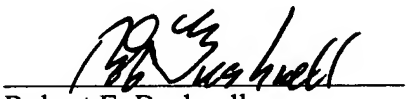
Therefore, the specification adequately teaches how to make and how to use a claimed invention without undue experimentation.

Withdrawal of the rejection is respectfully requested.

In view of the above, all claims are submitted to be allowable and this application is believed to be in condition to be passed to issue. Reconsideration of the rejections is requested. Should any questions remain unresolved, the Examiner is requested to telephone Applicant's attorney.

A fee of $1,240.00 is incurred by the submission of the Request for Continued Examination (RCE) ($790.00) and two-month extension of time ($450.00). Should the other fees be incurred, the Commissioner is authorized to charge Deposit Account No. 02-4943 of Applicant's undersigned attorney in the amount of such fees.

Respectfully submitted,



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